CLAIMS

We claim:

1. An exercise bicycle comprising:

a frame, including a seat and handlebars;

a high-inertia flywheel having a hub at a center of rotation, the flywheel being rotatably supported on the frame at the hub;

a drive train, including a drive sprocket, a crank arm attached to and extending from the drive sprocket, and a pedal attached to the crank arm, the drive train being rotatably supported by the frame, and a slave sprocket fixed to the flywheel at the hub, with the drive and slave sprockets connected in a direct-drive relationship, the drive train driveable in a forward and rearward directions to cause the flywheel to rotate;

a clutch positioned in engagement with the slave sprocket and the hub creating a frictional engagement between the sprocket and the hub, and creating a break-free force; and

wherein when said drive train is actuated in the forward direction, the slave sprocket and the hub move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the clutch mechanism slips between the slave sprocket and the hub, allowing the slave sprocket and the flywheel to move independently of one another.

2. An exercise bicycle as defined in claim 1, wherein:

the slave sprocket defines a sprocket collar mounted on the hub and defines an engagement collar;

a one-way bearing mounted between the sprocket collar and the hub to allow the sprocket collar to drive the hub when the sprocket collar is driven in a forward direction, and to allow the sprocket collar to spin independently of the hub when the sprocket collar is driven in the rearward direction;

an engagement flange fixedly mounted on the hub corresponding to the engagement collar;

compression means mounted on said flywheel to bias the flange and the collar towards one another;

a clutch material member positioned between said engagement flange and said collar, and clamped therebetween by the compression means to cause the engagement flange to move in conjunction with the sprocket collar, the engagement creating a break-free force required to cause the sprocket collar to move independently of the engagement flange; and

wherein, when said drive train is actuated in the forward direction, the sprocket collar and the engagement flange move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the engagement flange slips with respect to the collar, allowing the sprocket collar and the flywheel to move independently of one another.

3. An exercise bicycle as defined in claim 1, wherein:

the slave sprocket defines a sprocket collar mounted on the hub and defines an inner and outer engagement collars;

a one-way bearing mounted between the sprocket collar and the hub to allow the sprocket collar to drive the hub when the sprocket collar is driven in a forward direction, and to allow the sprocket collar to spin freely on the hub when the sprocket collar is driven in the rearward direction;

an inner engagement flange fixedly mounted on the hub corresponding to the inner engagement collar, and an outer engagement flange fixedly mounted on the hub corresponding to the outer engagement collar;

compression means mounted on said flywheel to bias the inner flange and the inner collar towards one another, and to bias the outer flange and the outer collar towards one another;

a clutch material member positioned between said outer engagement flange and said outer collar, and between said inner engagement flange and said inner collar, and clamped therebetween by the compression means to cause the inner and outer engagement flanges to move in conjunction with the sprocket collar, the engagement creating a break-free force required to cause the sprocket collar to move independently of inner and outer engagement flanges; and

wherein, when said drive train is actuated in the forward direction, the sprocket collar and the inner and outer flanges move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the

inner and outer engagement flanges slip with respect to the inner and outer collars, allowing the sprocket collar and the flywheel to move independently of one another.

4. An exercise bicycle as defined in claim 2, wherein said compression means is a Belleville washer.

5. An exercise bicycle as defined in claim 2, wherein said compression means is a plurality of Belleville washers.

6. An exercise bicycle as defined in claim 5, wherein said compression means is two Belleville washers positioned back-to-back.

7. An exercise bicycle as defined in claim 2, wherein said compression means is an elastomeric material.

8. An exercise bicycle as defined in claim 3, wherein said compression means is a Belleville washer.

9. An exercise bicycle as defined in claim 3, wherein said compression means is a plurality of Belleville washers.

10. An exercise bicycle as defined in claim 8, wherein said compression means is two Belleville washers positioned back-to-back.

11. An exercise bicycle as defined in claim 3, wherein said compression means is an elastomeric material.

12. An exercise bicycle as defined in claim 1, wherein:

the slave sprocket defines a sprocket collar mounted on the hub including an engagement collar;

a one-way bearing mounted between the sprocket collar and the hub to allow the sprocket collar to drive the hub when the sprocket collar is driven in a forward direction, and to allow the sprocket collar to spin independently on the hub when the sprocket collar is driven in the rearward direction;

a band brake fixedly mounted on the flywheel, the band brake having a belt attached to a housing, the belt frictionally engaging the engagement collar which causes the flywheel to move in conjunction with the sprocket collar, and creating a break-free force required to cause the belt to slip on the engagement collar allowing the sprocket collar to move independently of the flywheel; and

wherein, when said drive train is actuated in the forward direction, the sprocket collar and the flywheel move together, and when the drive train is actuated in

the rearward direction and overcomes the break-free force, the band slips with respect to the engagement collar, allowing the sprocket collar and the flywheel to move independently of one another.

13. An exercise bicycle as defined in claim 1, wherein:

the slave sprocket defines a sprocket collar mounted on the hub including an engagement collar;

a one-way bearing mounted between the sprocket collar and the hub to allow the sprocket collar to drive the axle when the sprocket collar is driven in a forward direction, and to allow the sprocket collar to spin independently on the axle when the sprocket collar is driven in the rearward direction;

a compression brake fixedly mounted on the flywheel, the compression brake having an arcuate compression member frictionally engaging the engagement collar which causes the flywheel to move in conjunction with the sprocket collar, and creating a break-free force required to cause the arcuate compression member to slip on the engagement collar allowing the sprocket collar to move independently of the flywheel; and

wherein, when said drive train is actuated in the forward direction, the sprocket collar and the flywheel move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the arcuate compression member slips with respect to the engagement collar, allowing the sprocket collar and the flywheel to move independently of one another.

14. A free-wheel clutch mechanism for an exercise bicycle, the bicycle having a frame, and a high-inertia flywheel having a hub at a center of rotation, the flywheel being rotatably supported on the frame at the hub, a drive train supported on the frame and engaged with the flywheel and driveable in a forward and rearward directions to cause the flywheel to rotate, the clutch mechanism comprising:

a slave sprocket fixed to the flywheel at the hub, the slave sprocket defining a sprocket collar which defines an engagement collar;

a clutch positioned in engagement with the slave sprocket and the hub creating a frictional engagement between the sprocket and the hub, and creating a break-free force; and

wherein when said drive train is actuated in the forward direction, the slave sprocket and the hub move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the clutch mechanism slips between the slave sprocket and the hub, allowing the slave sprocket and the flywheel to move independently of one another.

15. A clutch mechanism as defined in claim 14, wherein said clutch is self-adjusting.

16. An exercise bicycle as defined in claim 1, wherein said clutch is self-adjusting.

17. A frame for an exercise bicycle comprising:

a front support;

a rear support;

a brace member extending between said front and rear ground supports;

front forks having a top end and a bottom end, and attached at the bottom end to said front ground support, and rotatably supporting a high-inertia flywheel;

a rear post having a top member and a bottom member, said top member attaching to said bottom member in a rear offset overlapping manner, said rear post defining a top end and a bottom end, and being attached at the bottom end to said brace member;

an articulated beam attached to and extending from said top end of said front forks downwardly and rearwardly to a midpoint between said front forks and said rear post, then extending horizontally to said rear post at said intersection of said top and bottom members of said rear post;

a rear truss extending from said top member of said rear post to said rear support;

a handlebar attached at the top end of said front forks;

a seat attached at the top end of said rear post;

a front area defined by the front forks, articulated beam, rear post and brace member forming a five-sided polygon; and

a rear area defined by the rear post, rear truss, and brace member forming a five-sided polygon.

18. A frame for an exercise bicycle as defined in 17, wherein:

the high-inertia flywheel has a hub at a center of rotation, the flywheel being rotatably supported on the frame at the hub, and further comprises:

a drive train, including a drive sprocket, a crank arm attached to and extending from the drive sprocket, and a pedal attached to the crank arm, the drive train being rotatably supported by the frame, and a slave sprocket fixed to the flywheel at the hub, with the drive and slave sprockets connected in a direct-drive relationship, the drive train driveable in a forward and rearward directions to cause the flywheel to rotate;

a clutch positioned in engagement with the slave sprocket and the hub creating a frictional engagement between the sprocket and the hub, and creating a break-free force; and

wherein when said drive train is actuated in the forward direction, the slave sprocket and the hub move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the clutch mechanism slips between the slave sprocket and the hub, allowing the slave sprocket and the flywheel to move independently of one another.

19. A clutch mechanism for a rotary-driven mechanism having a hub and a drive train driveable in a forward and rearward directions to cause the mechanism to rotate, the clutch mechanism comprising:

a slave sprocket fixed to the flywheel at the hub;

a clutch positioned in engagement with the slave sprocket and the hub creating a frictional engagement between the sprocket and the hub, and creating a break-free force; and

wherein when said drive train is actuated in the forward direction, the slave sprocket and the hub move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the clutch mechanism slips between the slave sprocket and the hub, allowing the slave sprocket and the flywheel to move independently of one another.

20. A clutch mechanism as defined in claim 19, wherein:

the slave sprocket defines a sprocket collar mounted on the hub and defines an engagement collar;

a one-way bearing mounted between the sprocket collar and the hub to allow the sprocket collar to drive the hub when the sprocket collar is driven in a forward direction, and to allow the sprocket collar to spin independently of the hub when the sprocket collar is driven in the rearward direction;

an engagement flange fixedly mounted on the hub corresponding to the engagement collar;

compression means mounted on said flywheel to bias the flange and the collar towards one another;

a clutch material member positioned between said engagement flange and said collar, and clamped therebetween by the compression means to cause the engagement flange to move in conjunction with the sprocket collar, the engagement creating a break-free force required to cause the sprocket collar to move independently of the engagement flange; and

wherein, when said drive train is actuated in the forward direction, the sprocket collar and the engagement flange move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the engagement flange slips with respect to the collar, allowing the sprocket collar and the flywheel to move independently of one another.

21. A clutch mechanism as defined in claim 19, wherein:

the slave sprocket defines a sprocket collar mounted on the hub and defines an inner and outer engagement collars;

a one-way bearing mounted between the sprocket collar and the hub to allow the sprocket collar to drive the hub when the sprocket collar is driven in a forward direction, and to allow the sprocket collar to spin freely on the hub when the sprocket collar is driven in the rearward direction;

an inner engagement flange fixedly mounted on the hub corresponding to the inner engagement collar, and an outer engagement flange fixedly mounted on the hub corresponding to the outer engagement collar;

compression means mounted on said flywheel to bias the inner flange and the inner collar towards one another, and to bias the outer flange and the outer collar towards one another;

a clutch material member positioned between said outer engagement flange and said outer collar, and between said inner engagement flange and said inner collar, and clamped therebetween by the compression means to cause the inner and outer engagement flanges to move in conjunction with the sprocket collar, the engagement creating a break-free force required to cause the sprocket collar to move independently of inner and outer engagement flanges; and

wherein, when said drive train is actuated in the forward direction, the sprocket collar and the inner and outer flanges move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the inner and outer engagement flanges slip with respect to the inner and outer collars, allowing the sprocket collar and the flywheel to move independently of one another.

22. A clutch mechanism as defined in claim 20, wherein said compression means is a Belleville washer.

23. A clutch mechanism as defined in claim 20, wherein said compression means is a plurality of Belleville washers.

24. A clutch mechanism as defined in claim 23, wherein said compression means is two Belleville washers positioned back-to-back.

25. A clutch mechanism as defined in claim 20, wherein said compression means is an elastomeric material.

26. A clutch mechanism as defined in claim 21, wherein said compression means is a Belleville washer.

27. A clutch mechanism as defined in claim 21, wherein said compression means is a plurality of Belleville washers.

28. A clutch mechanism as defined in claim 26, wherein said compression means is two Belleville washers positioned back-to-back.

29. A clutch mechanism as defined in claim 21, wherein said compression means is an elastomeric material.

30. A clutch mechanism as defined in claim 19, wherein:

the slave sprocket defines a sprocket collar mounted on the hub including an engagement collar;

a one-way bearing mounted between the sprocket collar and the hub to allow the sprocket collar to drive the hub when the sprocket collar is driven in a forward

direction, and to allow the sprocket collar to spin independently on the hub when the sprocket collar is driven in the rearward direction;

a band brake fixedly mounted on the flywheel, the band brake having a belt attached to a housing, the belt frictionally engaging the engagement collar which causes the flywheel to move in conjunction with the sprocket collar, and creating a break-free force required to cause the belt to slip on the engagement collar allowing the sprocket collar to move independently of the flywheel; and

wherein, when said drive train is actuated in the forward direction, the sprocket collar and the flywheel move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the band slips with respect to the engagement collar, allowing the sprocket collar and the flywheel to move independently of one another.

31. A clutch mechanism as defined in claim 19, wherein:

the slave sprocket defines a sprocket collar mounted on the hub including an engagement collar;

a one-way bearing mounted between the sprocket collar and the hub to allow the sprocket collar to drive the axle when the sprocket collar is driven in a forward direction, and to allow the sprocket collar to spin independently on the axle when the sprocket collar is driven in the rearward direction;

a compression brake fixedly mounted on the flywheel, the compression brake having an arcuate compression member frictionally engaging the engagement collar which causes the flywheel to move in conjunction with the sprocket collar, and creating a break-free force required to cause the arcuate compression member to slip on the engagement collar allowing the sprocket collar to move independently of the flywheel; and

wherein, when said drive train is actuated in the forward direction, the sprocket collar and the flywheel move together, and when the drive train is actuated in the rearward direction and overcomes the break-free force, the arcuate compression member slips with respect to the engagement collar, allowing the sprocket collar and the flywheel to move independently of one another.